

What Is Claimed Is:

1. A process for producing hydrogen from anaerobically digested organic materials comprising the steps of:

placing said materials in a reaction zone; and applying an electric potential across said materials; thereby producing hydrogen and carbon dioxide whereby said electric potential is applied occasionally after periods without application of said electric potential.

2. A process as in Claim 1 in which said occasional application of said electric potential is timed to occur at a frequency and for a period to maximize the quantity of hydrogen produced per the amount of electricity consumed.

3. A process as in Claim 1 wherein a portion of said hydrogen is used by an energy conversion means to supply said electric potential.

4. A process as in Claim 1 in which said occasional application of said electric potential is timed to occur at a frequency and for a period to maximize the quantity of hydrogen produced per the amount of electricity consumed and wherein a portion of said hydrogen is used by an energy conversion means to supply said electric potential.

5. A process as in Claim 1 in which said electric potential is applied across electrodes.

6. A process as in Claim 1 in which said electric potential is applied across multiple electrodes.

7. A process for producing hydrogen from anaerobically digested organic materials /comprising the steps of:

placing said materials in a reaction zone; and applying an electric potential across said materials; thereby producing hydrogen and carbon dioxide whereby said electric potential is applied occasionally after periods without application of said electric potential,

separating said carbon dioxide and hydrogen by a separation means.

8. A process as in Claim 7 in which said separation means provides absorption of carbon dioxide in a pressurized fluid that allows the escape of hydrogen to a collection means.

9. A process as in Claim 7 in which said pressurized fluid is developed by a head of fluid that produces preferential absorption of carbon dioxide.

10. A process as in Claim 7 in which pressurized fluid is developed by a head of fluid and said fluid is maintained within a desirable range of operating temperatures by subsoil conditions.

11. A process as in Claim 7 in which said separation means comprises the steps of:

pressurizing a fluid to a state that provides preferential absorption of carbon dioxide,

mixing said hydrogen and carbon dioxide with said fluid,

collecting said hydrogen that remains after said preferential absorption of carbon dioxide,

expanding said pressurized fluid to produce work on a motor,

releasing said carbon dioxide in conjunction with said expanding process.

12. A process as in Claim 7 in which said separation means comprises the steps of:

pressurizing a fluid to a state that provides preferential absorption of carbon dioxide,

mixing said hydrogen and said carbon dioxide with said fluid,

collecting said hydrogen that remains after said preferential absorption of carbon dioxide, adding heat to said fluid after said preferential absorption of carbon dioxide for the purpose of increasing the amount of work produced by a motor that expands said pressurized fluid,

releasing said carbon dioxide in conjunction with said expanding process.

13. A process as in Claim 7 in which said separation means comprises the steps of:

pressurizing a fluid to a state that provides preferential absorption of carbon dioxide,

mixing said hydrogen and carbon dioxide with said fluid,

collecting said hydrogen that remains after said preferential absorption of carbon dioxide,

adding heat to said fluid after said preferential absorption of carbon dioxide for the purpose of increasing the amount of work produced by a motor that expands said pressurized fluid,

releasing said carbon dioxide in conjunction with said expanding process, and
cooling said fluid before said pressurizing step.

14. A process as in Claim 7 in which said separation means comprises the steps of:

pressurizing a fluid to a state that provides preferential absorption of carbon dioxide, mixing said hydrogen and carbon dioxide with said fluid,

collecting said hydrogen that remains after said preferential absorption of carbon dioxide,

adding heat to said fluid after said preferential absorption of carbon dioxide for the purpose of increasing the amount of work produced by a motor that expands said pressurized fluid,

releasing said carbon dioxide in conjunction with said expanding process, and
cooling said fluid before said pressurizing step and wherein said heat is selected from the group including solar energy, heat released by combustion of a portion of said hydrogen, concentrated solar energy, and a combination of solar energy along with heat produced by combustion of a portion of said hydrogen.

15. An energy conversion process comprised of the steps of anaerobically digesting organic materials to produce carbon dioxide and fuel selected from the group including hydrogen, methane, and mixtures of hydrogen and methane, separating said carbon dioxide from said fuel in which said separation comprises the steps of:

pressurizing a fluid to a state that provides preferential absorption of carbon dioxide,

mixing said carbon dioxide and said fuel with said fluid,

collecting said hydrogen that remains after said preferential absorption of carbon dioxide,

adding heat to said fluid after said preferential absorption of carbon dioxide for the purpose of increasing the amount of work produced by a motor that expands said pressurized fluid,

releasing said carbon dioxide in conjunction with said expanding process, and cooling said fluid before said pressurizing step.

16. A process for producing hydrogen from anaerobically digested organic materials comprising the steps of:

5 placing said materials in a reaction zone; and applying an electric potential across said materials; thereby producing hydrogen and carbon dioxide whereby said electric potential is applied occasionally after periods without application of said electric potential whereby the amount of time required to reduce the amount of said organic materials is substantially reduced compared to the time required without application of
10 said electric potential.

17. A process for conversion of biomass wastes into useful energy comprising the steps of: application of intermittent voltage for purposes selected from the group including depression of microorganismal activity that produces methane, enhancement of microorganismal activity that produces hydrogen, and creation of an atmosphere within said biomass wastes that is maintained rich in hydrogen.

18. The process of claim 17 in which said voltage is generated by means selected from the group including: an hydrogen fuel cell, an engine using hydrogen for fuel, a combination of a fuel cell and an engine both using hydrogen fuel, and a thermoelectric generator.

19. The process of claim 17 in which feedback information from a gas detector means is provided to a controller means, if trace amounts of methane are detected said voltage is applied between to electrode means for a recorded time period until methane production is depressed, the time until methane traces are detected again is noted by said controller means and a duty cycle of applying said voltage across said electrodes
25 means for a time interval slightly longer than said time noted for depressing methane production followed by neutral electrode operation for a time period slightly less than the time noted previously for traces of methane to be detected.

20. The process as in claim 17 in which feedback information from a gas detector means is provided to a controller means, if trace amounts of methane are
30 detected said voltage is applied between to electrode means for a recorded time period until methane production is depressed, the time until methane traces are detected again

is noted by said controller means and a duty cycle of applying said voltage across said electrodes means for a time interval slightly longer than said time noted for depressing methane production followed by neutral electrode operation for a time period slightly less than the time noted previously for traces of methane to be detected and in which
5 said duty cycle is adaptively changed to shorten the time of voltage application and to extend the time between voltage application for purposes of minimizing methane production while maximizing hydrogen production with least application of said voltage to said electrodes means.

21. The process of claim 17 in which said voltage level is variably reduced to
10 provide an adaptively adjusted control with respect to the time of said voltage application to minimize energy expenditure.

22. The process of claim 17 in which an inoculum means selected from the group including human sewage, medium from mature anaerobic digestion of organic materials within an occasionally applied voltage, and medium from anaerobic digestion
15 that is conducted in the presence of increased concentrations of hydrogen wherein said inoculum is added to substantially organic materials selected from the group including manure, crop wastes, and garbage for purposes of increasing the efficiency of conversion of chemical potential energy in organic materials to hydrogen.